

CLAIMS

THE FOLLOWING IS CLAIMED:

1 1. A process for low-damage anisotropic dry etching of a substrate, comprising the  
2 steps of:  
3 placing a substrate on a mechanical support within a plasma reactor, said  
4 mechanical support isolated from the creation of the plasma; and  
5 subjecting the substrate to a plasma including low energy electrons having a  
6 kinetic energy less than about 100 eV and at least one species reactive with the substrate.

1 2. The process of Claim 1, further comprising the step of selecting said substrate  
2 from the group consisting of Group III-V semiconductors, Group IV semiconductors, Group II-  
3 VI semiconductors, metals, alloys of the foregoing, superconductors, polymers, and insulating  
4 substrates.

1 3. The process of Claim 1, wherein said plasma reactor generates a dc plasma.

1 4. The process of Claim 1, wherein said plasma reactor generates an ac plasma.

1 5. The process of Claim 1, wherein said mechanical support is electrically biased,  
2 said mechanical support imparting said electrical bias upon the substrate.

1 6. The process of Claim 5, wherein said mechanical support imparts a dc electrical  
2 bias upon the substrate .

1 7. The process of Claim 5, wherein said mechanical support imparts an ac bias upon  
2 the substrate.

1 8. The process of Claim 5, wherein said mechanical support imparts both a dc and an  
2 ac bias upon the substrate.

1 9. The process of Claim 5, further comprising the step of periodically modulating  
2 said electrical bias of said mechanical support to a value below that of a value of the plasma.

1 10. The process of Claim 1, further comprising the step of including an additional  
2 structure within said plasma, said additional structure capable of being electrically biased.

1 11. The process of Claim 10, wherein said additional structure is dc electrically  
2 biased.

1 12. The process of Claim 10, wherein said additional structure is ac electrically  
2 biased.

1 13. The process of Claim 10, wherein said additional structure is both ac and dc  
2 electrically biased.

1 14. A process for low-damage anisotropic dry etching of a substrate, comprising the  
2 steps of:

3 providing a direct current plasma reactor including a cathode and an anode;

4 placing a semiconductor on the anode of the direct current plasma reactor;

5 generating low energy electrons with a cold cathode;

6 subjecting the semiconductor to a plasma including low energy electrons and a  
7 species reactive with the semiconductor; and

8 placing an additional structure within said plasma, said additional structure  
9 capable of being electrically biased.

1 15. The process of Claim 14, further comprising the step of selecting said substrate  
 2 from the group consisting of Group III-V semiconductors, Group IV semiconductors, Group II-  
 3 VI semiconductors, metals, alloys of the foregoing, superconductors, polymers, and insulating  
 4 substrates.

1 16. The process of Claim 14, wherein said additional structure is dc electrically  
 2 biased.

1 17. The process of Claim 14, wherein said additional structure is ac electrically  
 2 biased.

1 18. The process of Claim 14, wherein said additional structure is both ac and dc  
 2 electrically biased.

1 19. An apparatus for low-damage anisotropic dry etching of a substrate, comprising:  
 2 a plasma reactor; and  
 3 a mechanical support within said plasma reactor, said mechanical support isolated  
 4 from the creation of the plasma.

1 20. The apparatus of Claim 19, wherein said substrate is selected from the group  
 2 consisting of Group III-V semiconductors, Group IV semiconductors, Group II-VI  
 3 semiconductors, metals, alloys of the foregoing, superconductors, polymers, and insulating  
 4 substrates.

1 21. The apparatus of Claim 19, wherein said plasma reactor generates a dc plasma.

1 22. The apparatus of Claim 19, wherein said plasma reactor generates an ac plasma.

1 23. The apparatus of Claim 19, wherein said mechanical support is electrically biased,  
 2 said mechanical support imparting said electrical bias upon the substrate.

1 24. The apparatus of Claim 23, wherein said mechanical support imparts a dc  
 2 electrical bias upon the substrate .

1 25. The apparatus of Claim 23, wherein said mechanical support imparts an ac bias  
 2 upon the substrate.

1 26. The apparatus of Claim 23, wherein said mechanical support imparts both a dc  
 2 and an ac bias upon the substrate.

1 27. The apparatus of Claim 19, further comprising an additional structure within said  
 2 plasma, said additional structure capable of being electrically biased.

1 28. The apparatus of Claim 27, wherein said additional structure is dc electrically  
 2 biased.

1 29. The apparatus of Claim 27 , wherein said additional structure is ac electrically  
 2 biased.

1 30. The apparatus of Claim 27, wherein said additional structure is both ac and dc  
 2 electrically biased.

1 31. An apparatus for low-damage anisotropic dry etching of a substrate, comprising:  
 2 a direct current plasma reactor including a cathode and an anode;  
 3 a semiconductor placed on the anode of the direct current plasma reactor;  
 4 means for generating low energy electrons with a cold cathode;

5 means for subjecting the semiconductor to a plasma including low energy  
 6 electrons and a species reactive with the semiconductor; and  
 7 an additional structure within said plasma, said additional structure capable of  
 8 being electrically biased.

1 32. The apparatus of Claim 31, wherein said substrate from the group consisting of  
 2 Group III-V semiconductors, Group IV semiconductors, Group II-VI semiconductors, metals,  
 3 alloys of the foregoing, superconductors, polymers, and insulating substrates.

1 33. The apparatus of Claim 32, wherein said additional structure is dc electrically  
 2 biased.

1 34. The apparatus of Claim 32, wherein said additional structure is ac electrically  
 2 biased.

1 35. The apparatus of Claim 32, wherein said additional structure is both ac and dc  
 2 electrically biased.